

Proposal for amendments to ECE/TRANS/WP.29/GRVA/2019/5

Proposal for amendments to a new UN Regulation from the IWG on AEBS

The text reproduced below was prepared by the informal working group on Advanced Emergency Braking Systems. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters. The amendments to the text proposed by OICA and CLEPA is noted as follow:

I. Proposal

Paragraph 2.19., amend to read

- 2.18. "*Mass of a vehicle in running order*" means the mass of ~~an the unladen~~ **vehicle under test** with bodywork, including coolant, oils, 90 per cent of fuel, 100 per cent of other liquids, driver (75 kg) but except used waters, tools, spare wheel.
- 2.19. "*Unladen vehicle*" means the mass in running order **of the vehicle under test** with an additional mass of maximum 125 kg. This additional mass includes the measuring equipment and a possible second person on the front seat who is responsible for noting the results
- 2.20. "*Laden vehicle*" means, except where otherwise stated, ~~a~~ **the vehicle under test is** so laden as to attain its **at least 90% of its**"maximum mass"
- 2.21. "*Maximum mass*" means the maximum mass stated by the vehicle manufacturer to be technically permissible **for the vehicle under test** (this mass may be higher than the "permissible maximum mass" laid down by the national administration).

Paragraph 6.2., amend to read

6.2. Vehicle Conditions

6.2.1. Test Weight

The vehicle shall be tested in at least the unladen and laden conditions.

The load distribution shall be according to the manufacturer's recommendation **and it shall be annexed to the test report**. No alteration shall be made once the test procedure has begun.

I. Justification

In the Regulation the term ‘unladen vehicle’ is used to describe the ‘mass of a vehicle in running order’ with additional mass to take into account for test equipment. The term ‘unladen’ should therefore not be repeated to aid the definition of ‘mass of the vehicle in running order’.

It is very difficult to ensure and maintain that the mass of the vehicle under test remains at its maximum mass. Therefore the proposal for testing the vehicle with a mass of at least 90% provides the technical service with a tolerance to test to.

It is important to record the mass of the vehicle under test and the axle load distribution in the test report to ensure the repeatability of tests during market surveillance.

II. Proposal

Paragraph 2.19., amend to read

5.1.6. False reaction avoidance

The system shall be designed to minimise the generation of collision warning signals and to avoid ~~autonomous~~ **advanced emergency** braking in situations where the driver would not recognise an impending collision. This shall be demonstrated in the assessment carried out under Annex 3 of this Regulation for the scenarios listed in its Appendix 2.

II. Justification

To align with the correct terminology in the Regulation.

III. Proposal

Paragraph 2.17., amend to read

~~2.17. "Calibration" means the process of setting a measurement system's response so that its output agrees with a range of reference signals."~~

2.17. "Initialisation" means the process of setting-up the operation of the system after switching ON the vehicle until it is fully functioning."

Paragraph 5.1.4.1.2., amend to read

5.1.4.1.2. If the system has not been ~~calibrated~~ **initialized** after a cumulative driving time of 15 seconds above a speed of 10km/h, information of this status shall be indicated to the driver. This information shall exist until the system has been successfully ~~calibrated~~ **initialized**.

6.2.2.1. If requested by the vehicle manufacturer,

The vehicle can be driven a maximum of 100 km on a mixture of urban and rural roads with other traffic and roadside furniture to ~~calibrate~~ **initialize** the sensor system.

III. Justification

The definition of ‘calibration’ is not appropriate for an AEBS system because there are no measurement systems or reference signals to compare the AEBS output to. The term ‘initialisation’ is more applicable to the initial phase an AEBS system after each ignition cycle.

IV. Proposal

Paragraph 5.3., amend to read

5.3. Interruption by the driver

4.3.1. The AEBS ~~shall~~ **may** provide the means for the driver to interrupt the collision warning phase.

4.3.2. **The AEBS shall provide the means for the driver to interrupt the emergency braking phase.**

~~4.3.23.~~ In both cases above, this interruption may be initiated by any positive action (e.g. kick down, operating the direction indicator control) that indicates that the driver is aware of the emergency situation. The vehicle manufacturer shall provide a list of these positive actions to the technical service at the time of type approval and it shall be annexed to the test report.

IV. Justification

It is currently mentioned that the means for the driver to interrupt the collision warning shall be provided. Manufacturers should have the freedom to not interrupt the warning. In some cases it might be difficult to judge if the driver is really aware of the emergency situation and the system should not deactivate the collision warning.

V. Proposal

Paragraph 5.2.1.4. and 5.2.2.4., amend to read

5.2.1.4. Speed reduction by braking demand

When the system is activated, the AEBS shall be able to achieve the maximum relative impact speed as shown in the following table:

- for collisions with constantly travelling or stationary targets;
- on dry roads **with an ambient temperature between 0 and 45°C**;
- in laden and unladen conditions;
- in situations where the vehicle longitudinal centre planes are displaced by not more than 0.2 m; and ~~or~~
- in ambient illumination conditions of at least 1000 Lux.

V. Justification

The threshold for the ambient temperature in the test procedure is included in the requirements to ensure consistency within the Regulation.

The conjunctive ‘or’ should be removed as implies that only one of the parameters in the list needs to be met for the vehicle under test to achieve the braking performance requirements.

VI. Proposal

Paragraph 6.2.2.1., amend to read

6.2.2.1. If requested by the vehicle manufacturer.

The vehicle can be driven a maximum of 100 km on a mixture of urban and rural roads with other traffic and roadside furniture to calibrate the sensor system.

The vehicle can undergo a sequence of brake activations in order to ensure the service brake system is bedded in prior to the test.

The average temperature of the service brakes on the hottest axle of the vehicle, measured inside the brake linings or on the braking path of the disc or drum, is between 65 and 100°C prior to each test run.

VI. Justification

The methodology used to determine the speed at which full avoidance should occur is based on ideal test conditions. Therefore to replicate these ideal test conditions it should be ensured that the temperature of the brake linings are sufficient to achieve high levels of deceleration.

VII. Proposal

Paragraph 5.2.1.4., amend to read

5.2.1.4. Speed reduction by braking demand

...

It is recognised that the performances required in this table may not be fully achieved in other conditions than those listed above. However, the system shall not deactivate or **drastically unreasonably** change the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 3 of this Regulation.

VII. Justification

In certain circumstances it may be appropriate to drastically change the control strategy e.g. during very low overlap collisions, low road adhesion and when the AEBS system assumes the driver is in control of the vehicle. In such circumstance the control strategy may be changed drastically but the change is not unreasonable as it may be deemed the safest strategy by the system.

VIII. Proposal

Paragraph 5.2.2.4., amend to read

Maximum Impact Speed (km/h) for M₁ - second step [~~2023 in UNECE~~ i.e. 2023 in EU]

<i>Subject vehicle speed (km/h)</i>	<i>Laden</i>	<i>Unladen</i>
20	0.00	0.00

25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
42	10.00 27.00	0.00
45	15.00 30.00	15.00 30.00
50	25.00 35.00	25.00 35.00
55	30.00 40.00	30.00 40.00
60	35.00 45.00	35.00 45.00

Maximum Impact Speed (km/h) for N₁ - second step [~~(2023 in UNECE — i.e. 2023 in EU)~~] [except N₁ vehicles having α less or equal to 1.3]

Subject vehicle speed (km/h)	Laden	Unladen
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
42	10.00 27.00	0.00
45	15.00 30.00	15.00 30.00
50	25.00 35.00	25.00 35.00
55	30.00 40.00	30.00 40.00
60	35.00 45.00	35.00 45.00

[Maximum relative Impact Speed (km/h) for N₁ vehicles having α less or equal to 1.3

Subject vehicle speed (km/h)	Laden		Unladen	
	$\alpha > 1.3$	$\alpha \leq 1.3$	$\alpha > 1.3$	$\alpha \leq 1.3$
20	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00
35	0.00	15.00 20.00	0.00	0.00
40	0.00	20.00 25.00	0.00	15.00 25.00
42	10.00 27.00	25.00 27.00	0.00	20.00 27.00
45	15.00 30.00	25.00 30.00	15.00 30.00	25.00 30.00
50	25.00 35.00	35.00	25.00 35.00	30.00 35.00
55	30.00 40.00	40.00	30.00 40.00	35.00 40.00
60	35.00 45.00	45.00	35.00 45.00	40.00 45.00

VIII. Justification

Proposal for implementation of car to pedestrian requirements:

- 1st step (EIF i.e. ca 2020 in UNECE) full avoidance between 20-30km/h, 15km/h speed reduction between 30-60km/h
- 2nd step (2023 in UNECE) 20-42km/h, 15km/h speed reduction between 30-60km/h

The industry has a serious concern over the speed reduction requirements set in the second step for Car to Pedestrian. In order to calculate the theoretical speed reduction possible under the test scenarios defined in the regulation, 9m/s² deceleration was used. Industry were not in support of this and

requested to use those values for maximum deceleration defined in UNECE Regulation No.13 and 13-H. The current proposal sets the regulatory requirements to be more stringent than the requirements in ENCAP to achieve a 5 star rating.

IX. Proposal

Paragraph 6.4.1., 6.5.1., 6.6.1 and 6.7.1.1., amend to read

- 6.4.1. The subject vehicle shall approach the stationary target in a straight line for at least two seconds prior to the functional part of the test with a subject vehicle to target centreline offset of not more than 0.2 m.

Tests shall be conducted with a vehicle travelling at 20, 42 and 60 km/h (with a tolerance of +0/-2 km/h). If this is deemed justified. The technical service may test any other speeds within the speed range as defined in paragraph 5.2.1.3.

If the vehicle fails to meet the expected performance at a certain test speed and at the request of the manufacturer this test shall be repeated a further two times. In this case the test at this test speed shall be accounted as passed if the expected performance is met for two of the three test repetitions.

The functional part of the test shall start when the subject vehicle is travelling at a constant speed and is at a distance corresponding to a Time to Collision (TTC) of at least 4 seconds from the target.

From the start of the functional part until the point of collision there shall be no adjustment to any control of the subject vehicle by the driver other than slight adjustments to the steering control to counteract any drifting.

X. Justification

AEBS detection capabilities are based on real world sensor information, so that they are to work correctly in real world situations. Test setups, test targets and their related boundary conditions are prone to small unnatural deviations due to the inclusion of replica vehicles and pedestrians used as test targets.

To fulfil the requirements of this regulation a manufacturer must pass at least eleven separate test cases (3 for Car to Car stationary, 2 for Car to Car moving, 3 for Car to Pedestrian and 3 for Car to Bicyclist). If a test vehicle does not meet the full performance requirements required in the regulation for all tests, a type approval cannot be issued. Assuming a 99% probability for passing a single test case, the result is that more than 10% of vehicles with that performance would fail type approval. In order to account for the possibility for slight deviations in performance when testing against a replica target a repetition of tests should be possible.

XI. Proposal

Paragraph 6.3., amend to read

- 6.3. Test Targets
- 6.3.1. The target used for the vehicle detection tests shall be a regular high volume series production passenger car of Category M1 AA saloon. Or alternatively a "soft target" representative of such a vehicle in terms of its identification

characteristics applicable to the sensor system of the AEBS under test according to ISO ~~DIS~~ 19206-1 [or ISO 19206-3]. The reference point for the location of the vehicle shall be the most rearward point on the centreline of the vehicle.

- 6.3.2. The targets used for the pedestrian detection tests shall be a "soft target" and be representative of the human attributes applicable to the sensor system of the AEBS under test according to ISO ~~DIS~~ 19206-2.
- 6.3.3. The targets used for the bicycle detection tests shall be a "soft target" and be representative of the human and bicycle attributes applicable to the sensor system of the AEBS under test [according to ISO 19206-4].
- 6.3.4. Details that enable the target(s) to be specifically identified and reproduced shall be recorded in the vehicle type approval documentation.

XI. Justification

Regulation should not reference to an ISO standards that are not finalised and not publicly available.

- ISO 19206-1 was published in December 2018, so "DIS" can be removed. ISO 19206-3 should be referenced as an alternative to ISO 19206-1, as vehicle test targets according to ISO 19206-3 are expected to replace targets according to ISO 19206-1 in the long term.
- ISO 19206-3 is expected to be finalized and published in 2019, status as of January 2019 is Committee Draft (CD) (proposal to remove the [] once the ISO standard is public).
- A soft target for bicycle tests is defined in ISO 19206-4. Therefore this ISO standard should be referenced here. ISO 19206-4 is expected to be finalized and published in 2019, status as of January 2019 is Committee Draft (CD) (proposal to remove the [] once the ISO standard is public).

XII. Proposal

Paragraph 6.3., amend to read

- 6.8.2. The failure warning signal mentioned in paragraph 5.5.4. above shall be activated and remain activated not later than 10 s after the vehicle has been driven at a speed greater than 15km/h and be reactivated immediately after a subsequent ignition "off" ignition "on" cycle with the vehicle stationary as long as the simulated failure exists.

XII. Justification

No speed value is included in the draft regulation. 15km/h replicates the requirements in UNECE Regulation No.131.

XIII. Proposal

Annex 3, Appendix 2 Paragraph 1., amend to read

- 1.1. Two stationary vehicles. of Category M₁ AA saloon. shall be positioned:
 - (a) So as to face in the same direction of travel as the subject vehicle;
 - (b) With a distance of 4.5m (**with a tolerance of +/- 0.2m**) between them;

- (c) With the rear of each vehicle aligned with the other.

Annex 3, Appendix 2 Paragraph 2., amend to read

- 2.1. A pedestrian target as prescribed in 6.3.2. shall be positioned:
 - (a) So as to face in the same direction of travel as the subject vehicle.
 - (b) With a distance of 1 m (**with a tolerance of +/- 0.2m**) from the subject vehicle side closest to the target toward the side in the direction of traffic.

Annex 3, Appendix 2 Paragraph 3., amend to read

- 3.1. A bicycle target as prescribed in 6.3.3. shall be positioned:
 - (a) So as to face in the same direction of travel as the subject vehicle.
 - (b) With a distance of 1 m (**with a tolerance of +/- 0.2m**) from the subject vehicle side closest to the target toward the side in the direction of traffic.

XIII. Justification

To include a test tolerance for the distance between the subject vehicle and the target.

XIV. Proposal

Regulation Title., amend to read

UNITED NATIONS

AGREEMENT

**CONCERNING THE ADOPTION OF HARMONIZED TECHNICAL
UNITED NATIONS REGULATIONS FOR WHEELED VEHICLES,
EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE
USED ON WHEELED VEHICLES AND THE CONDITIONS FOR
RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE
BASIS OF THESE UNITED NATIONS REGULATIONS**

**(Revision 3, including the amendments which entered into force on
September 14, 2017)**

Addendum XXX: Regulation No. XXX-00

**Date of entry into force as an annex to the 1958 Agreement: September 01,
2021**

**UNIFORM PROVISIONS CONCERNING THE APPROVAL OF
VEHICLES WITH REGARD TO THEIR ADVANCED EMERGENCY
BRAKING SYSTEM (AEBS) FOR M1 AND N1 VEHICLES**

XIV. Justification

There are numerous technical challenges manufacturers have to meet in order to meet the requirements of the regulation e.g. collision warning strategy, deactivation requirements,

initialisation phase strategy and braking demand / performance. There should be a delay in which the regulation enters into force to protect those manufacturers with current systems in development.